



US009680160B2

(12) **United States Patent**
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(10) **Patent No.:** **US 9,680,160 B2**
(45) **Date of Patent:** **Jun. 13, 2017**

(54) **EXTENDED TWO DIMENSIONAL METAL NANOTUBES AND NANOWIRES USEFUL AS FUEL CELL CATALYSTS AND FUEL CELLS CONTAINING THE SAME**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 670 days.

(21) Appl. No.: **13/884,220**

(22) PCT Filed: **Nov. 8, 2011**

(86) PCT No.: **PCT/US2011/059815**
§ 371 (c)(1),
(2), (4) Date: **Jun. 6, 2013**

(87) PCT Pub. No.: **WO2012/064768**
PCT Pub. Date: **May 18, 2012**

(65) **Prior Publication Data**

US 2013/0260282 A1 Oct. 3, 2013

Related U.S. Application Data

(60) Provisional application No. 61/411,069, filed on Nov. 8, 2010, provisional application No. 61/411,074, filed
(Continued)

(51) **Int. Cl.**
H01M 4/92 (2006.01)
B82Y 30/00 (2011.01)
(Continued)

(52) **U.S. Cl.**
CPC **H01M 4/92** (2013.01); **B01J 23/38**
(2013.01); **B01J 35/0013** (2013.01); **B01J**
37/16 (2013.01);
(Continued)

(58) **Field of Classification Search**

None

See application file for complete search history.

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(57) **ABSTRACT**

Metal nanotubes are provided comprising a composition having formula $(M_1)_nNT$: wherein $M_1=Pt, Pd, or Au$; wherein the nanotubes have: a wall thickness of from 2 to 12 nm; an outer diameter of from 30 to 100 nm; and a length of from 5 to 30 μm . Metal nanowires are also provided comprising a composition having formula $(M_2)_nNW$: wherein $M_2=Ag$ or Cu ; wherein when $M_2=Ag$, the nanowires have a diameter of from 25 to 60 nm and a length of from 1 to 10 μm ; and when $M_2=Cu$, the nanowires have a diameter of from 50 to 100 nm and a length of from 10 to 50 μm . In other embodiments, fuel cells are also described having at least one anode; at least one cathode; an electrolyte membrane between the at least one anode and at least one cathode; and a catalyst comprising either of the above described metal nanotubes or nanowires.

11 Claims, 36 Drawing Sheets

